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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,114	10/12/2000	Hideo Shibahara	NEKW 17.876	6403

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EXAMINER

CALEY, MICHAEL H

ART UNIT	PAPER NUMBER
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2871

DATE MAILED: 07/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/689,114

Applicant(s)

SHIBAHARA, HIDEO

Examiner

Michael H. Caley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6-11,13-18 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-11,13-18 and 20-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 10, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi et al. (U.S. Patent No. 6,211,937 “Miyachi”) in view of Kishimoto et al. (U.S. Patent No. 6,281,960 “Kishimoto”) and Hoyt (U.S. Patent No. 5,953,087).

Regarding claims 1 and 10, Miyachi discloses a liquid crystal display panel having:

a pair of substrate structures (Figure 12E elements 10 and 13) having plural pixels (Column 5 lines 25-32, Column 10 line 66 – Column 11 line 18) where an image is produced,

liquid crystal (Column 1 lines 8-20) filling a gap between the pair of substrate structures and selectively making pixels dark and bright for producing the image,

column spacers (Figure 12E element 5) formed on one of the substrate structures of the pair and held in contact with the other of the substrate structures, at least one of the column spacers being formed within a matrix of the plural pixels, the matrix of the plural pixels being formed by rows and columns of the plural pixels (Figures 1 and 3-11), and

a sealing layer (Figure 12E element 16) formed between the matrix of the plural pixels and the peripheral area,

wherein no column spacers are formed in an area of the sealing layer (Column 11 lines 19-35).

Miyachi fails to disclose a ratio of a total contact area between the column spacers and the other of the substrate structures to the total area occupied by the plural pixels. Kishimoto, however, teaches a ratio between the total contact area between the column spacers and the other substrate to the total area occupied by the plural pixels as between 0.050 percent and 0.150 percent (Figures 6 and 7; Column 11 lines 18-26). Kishimoto teaches the use of one column spacer per three pixels (Figures 6 and 7). The total width of the three pixel structure including black matrix is 1110 microns (3×330 micron pixel width + 2×20 micron BM width + 2×30 micron BM width + 1×20 micron spacer width, extracted from Figure 6), while the length is 360 microns (330 micron pixel length + 30 micron BM length), making a unit structure per column spacer of 399,600 square microns (Figures 6 and 7). The spacer contact area is taught as 600 square microns (Figure 6). The ratio taught by Kishimoto is therefore 0.150%.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the display device disclosed by Miyachi to have a ratio of a total contact area between the column spacers and the other of the substrate structures to the total area occupied by the plural pixels between 0.050 percent and 0.150 percent. Kishimoto teaches such a ratio as sufficient to realize a display with a uniform cell gap at a high yield rate (Column 11 lines 17-32).

Miyachi further fails to disclose a reservoir formed between the substrate structures for preventing the pair of substrate structures from increasing the gap by accumulating part of the liquid crystal. Hoyt, however, teaches such a reservoir (Figure 1 element 18) for preventing the pair of substrate structures from increasing the gap by accumulating part of the liquid crystal (Column 3 lines 40-62, Column 6 lines 39-49).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the display device disclosed by Miyachi to have a reservoir for preventing an increase in cell gap. One would have been motivated to incorporate such a reservoir in the display device disclosed by Miyachi to prevent deformation of the liquid crystal cell cavity and bubble formation (Column 1 lines 35-50).

Regarding claim 2, Miyachi discloses the column spacers as respectively associated with the pixels (Figures 1 and 3-11).

Regarding claim 20, Hoyt discloses the reservoir as integrally formed between the substrate structures and the reservoir as adapted to accept a part of the liquid crystal from between the pair of substrate structures to prevent increasing the gap (abstract, Column 3 lines 40-62, Column 6 lines 39-49).

Regarding claim 21, Hoyt discloses the reservoir as adapted to accept a part of the liquid crystal from between the pair of substrate structures to prevent increasing the gap during a period

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of one of high external temperature and local direct pressure (abstract, Column 3 lines 40-62, Column 6 lines 39-49).

Claims 14-18, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Kishimoto and Hoyt and in further view of Mashiko et al. (U.S. Patent No. 6,288,766 "Mashiko").

Regarding claims 14 and 15, Miyachi fails to disclose the liquid crystal as exerting a pressure lower than the atmospheric pressure on the inner surfaces of the substrate structures while no electric power is applied at room temperature. Mashiko, however, teaches reducing a cell's internal pressure to a pressure lower than the external pressure as a step in the process of forming a liquid crystal cell (Column 3 lines 43-59). Since the cell is still being assembled when the pressure is being applied, there is no electrical power and the room temperature operation is disclosed in abstract and elsewhere.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to exert a pressure lower than the atmospheric pressure on the inner surfaces of the substrate structure. One would have been motivated to form the cell with such a step as taught by Mashiko to benefit from the process that reduces damage to the cell and occurrences of bubbles and cavitation of the cell (Column 3 lines 43-47).

Regarding claims 16-18, Mashiko also discloses the pressure from vacuum as 1-50 torr (Col. 11, lines 57-60). Atmospheric pressure is equal to 100,000 N/m² and also equals to approximately 760 torr, it would have been obvious to one having an ordinary skill in the art to

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convert the above units to come up with the recited features of 0.01 N/m² to 6KN/m² as recited in claims 16 and 17. Since the cell is still being assembled when the pressure is being applied, there is no electrical power and the room temperature operation is disclosed in abstract and elsewhere.

Regarding claim 22, Hoyt discloses the reservoir as integrally formed between the substrate structures and the reservoir as adapted to accept a part of the liquid crystal from between the pair of substrate structures to prevent increasing the gap (abstract, Column 3 lines 40-62, Column 6 lines 39-49).

Regarding claim 23 Hoyt discloses the reservoir as adapted to accept a part of the liquid crystal from between the pair of substrate structures to prevent increasing the gap during a period of one of high external temperature and local direct pressure (abstract, Column 3 lines 40-62, Column 6 lines 39-49).

Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Kishimoto and Mashiko and in further view of Nishino et al. (U.S. Patent No. 6,010,384 "Nishino").

Miyachi as modified by Kishimoto and Mashiko fails to disclose additional column spacers formed outside the matrix of the plural pixels such that the additional column spacers are formed in the peripheral areas. Nishino, however, teaches columnar spacers formed in the

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peripheral area outside the sealing material in addition to the column spacers formed in the matrix of plural pixels (Column 6 lines 18-28, Column 11 lines 8-12; Figures 5, 8, and 10F) as a means of reducing defects that occur during separation of individual panels during the cutting process (Column 2 lines 35-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed additional column spacers outside the matrix of plural pixels in the peripheral areas. One would have been motivated to place additional column spacers accordingly to prevent cut defects and reduction of manufacturing yield due to such defects (Column 2 lines 46-50).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Kishimoto and further in view of Ishikawa et al. (U.S. Patent No. 6,414,733 “Ishikawa”).

Miyachi discloses common electrode (Column 11 line 21), but Miyachi does not explicitly disclose switching elements and the connection of these switching elements to the pixel electrodes. Ishikawa on the other hand, in disclosing a liquid crystal display device not only discloses column spacers, switching elements TFT (23), pixel electrodes but also discloses the use of common electrode (22) on one of the substrates. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adapt the switching elements, common electrode as disclosed by Ishikawa to the LCD disclosed by Miyachi to enhance the display efficiency and contrast ratio.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Kishimoto and Ishikawa and further in view of Ogura et al. (U.S. Patent No. 5,739,888 "Ogura").

Miyachi and Ishikawa disclose column spacers but not spherical spacers or reinforcement spacers in the sealing layer or the specific relationship between the diameter of the spacer to the thicknesses of the various films.

Ogura discloses a sealing layer (28) spacers (30) and the relationship of the diameter of the spacer to the thicknesses of various films (Col. 6, line 50-65 and col. 9, lines 35-54). Ogura also discloses that the particle diameter of the spacers (11).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adapt the specified thickness relationship as disclosed by Ogura to the display device as recited in instant claims so as to provide a display element which is free from irregularities in luminance in its effective display area and has uniform display quality (Col. 3, lines 32-34 of Ogura).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Kishimoto and in further view of Murouchi (U.S. Patent No. 6,067,144).

Miyachi as modified by Kishimoto discloses each of the proposed limitations except that the column spacers are classified into two groups one of which is taller than the other. Murouchi on the other hand, in disclosing LCD cell discloses two supporting members (4 and 5) having column shapes with different heights one being taller than the other (Fig. 3).

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the Kishimoto LCD panel with that of Murouchi having column spacers with two different heights in order to reduce the problems due to the width changes identified in the prior art discussion (col. 1, lines 11-67) and provides a rigid liquid crystal display cell with superior productivity and durability (col. 2, lines 13-15).

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyachi in view of Hoyt.

Miyachi discloses each of the proposed limitations except for a reservoir formed between the substrate structures for preventing the pair of substrate structures from increasing the gap by accumulating part of the liquid crystal. Hoyt, however, teaches such a reservoir (Figure 1 element 18) for preventing the pair of substrate structures from increasing the gap by accumulating part of the liquid crystal (Column 3 lines 40-62, Column 6 lines 39-49).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the display device disclosed by Miyachi to have a reservoir for preventing an increase in cell gap. One would have been motivated to incorporate such a reservoir in the display device disclosed by Miyachi to prevent deformation of the liquid crystal cell cavity and bubble formation (Column 1 lines 35-50).

Response to Arguments

Applicant's arguments with respect to claims 1 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael H. Caley whose telephone number is (571) 272-2286. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael H. Caley

July 24, 2006



mhc



ANDREW SCHECHTER
PRIMARY EXAMINER